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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,468	12/05/2003	Shang Chen	1856-42400 (9820.0-02)	2847

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EXAMINER

BULLOCK, IN SUK C

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 10/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/730,468

Applicant(s)

CHEN ET AL.

Examiner

In Suk Bullock

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 03/12/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 22-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear what the basis is for the percent recited, i.e., mole %, weight %, etc.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6, 9, 10, 11, 12, 13, 14, 26, 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Griffiths et al. (6,395,944).

The reference to Griffiths et al. teaches a process for the production of a mono-olefin from a paraffinic feedstock comprising feeding the feedstock and a molecular oxygen-containing gas to an autothermal cracker where they are reacted by oxidative dehydrogenation in the presence of a catalyst to form a product comprising one or more mono-olefins(s) and synthesis gas (carbon monoxide and hydrogen), and separating the product into a synthesis gas-containing stream and one more olefins and recovering

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the one or more olefins (col. 2, lines 27-39). The paraffinic hydrocarbon may be ethane, propane, or butane and may be substantially pure or may be in admixture with other hydrocarbons. Optionally, other feed components such as carbon monoxide and hydrogen may be included. See col. 3, lines 24-30. The catalyst comprises a platinum group metal, a promoter such as copper and tin, and a support material such as alumina (col. 3, lines 1-16). Means for separating synthesis gas from mono-olefins are well known in the art, e.g., cryogenic separation (col. 4, lines 14-19 and col. 7, lines 20-31).

Claims 1, 6-14, 22-25, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Bharadwaj et al. (6,166,283).

The reference to Bharadwaj et al. teaches a process for the partial oxidation of paraffinic hydrocarbons, e.g., ethane, to olefins, e.g., ethylene, with oxygen in the presence of hydrogen and a catalyst. The paraffin contains 2 to about 10 carbon atoms. Additional feed components may include carbon monoxide. The catalyst comprises the platinum group metal, a promoter such as tin and copper, and a support such as alumina. See col. 4, lines 59-67; col. 5, line 59 to col. 6, line 52; and col. 8, lines 35-55; and col. 9, lines 35-37). The conversion of paraffinic hydrocarbon is typically greater than about 45 mole percent, preferably greater than about 50 mole percent, and more preferably greater than about 60 mole percent. The olefin selectivity is typically greater than about 50 carbon atom percent, preferably greater than about 70 carbon atom percent, and more preferably greater than about 80 carbon atom percent.

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Other products formed include carbon dioxide, carbon monoxide, and methane and at least a part of the products formed may be recycled to the reactor. See col. 16, lines 22-65.

It is noted that in column 6, lines 30-31 a number is missing with respect to the number of carbon atoms in the phrase "from 2 to about ? carbon atoms ." This is an obvious error. It is disclosed in a later patent to Bharadwaj et al. (6,566,573) directed to the same process that the preferred carbon number of atoms is in the range of 2 to 10 (col. 5, lines 40-48). One may assume that the missing number in the 6,166,283 patent is "10". Therefore, claim 7 is deemed to be anticipated by Bharadwaj et al. (6,166,283).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2-5, 7, 8, 15-25, and 28-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Griffiths et al. (6,395,944) in view of Liu (6,417,422) or Bharadwaj et al. (6,166,283).

The teachings of Griffiths et al. reference are as discussed above. In addition, the reference also teaches paraffinic hydrocarbon/molecular oxygen-containing gas mixture is from 5 to 13.5 times the stoichiometric ratio of hydrocarbon to oxygen-containing as for complete combustion to carbon dioxide and water. The reactor is operated at a temperature greater than 500° C, pressures of 1 to 30 bara, and GHSV of greater than 80,000 hr<sup>-1</sup> (col. 3, line 39 to col. 4, line 5). The feedstock and the oxygen-containing gas are preheated to 200-500°C.

The difference between Griffiths et al. and the claimed invention is that the reference does not disclose recycling at least a portion of the product stream.

The reference to Liu teaches oxidative dehydrogenation of alkanes, especially oxidative dehydrogenation of ethane to ethylene in the presence of nickel-containing

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catalysts (col. 1, lines 12-20). Liu also teaches to recycle the product stream back to the feed stream which results in an overall improvement in conversion and selectivity (col. 16, lines 10-29).

The teachings of Bharadwaj et al. are as discussed above.

Recycling in the hydrocarbon conversion art is well known and conventional as shown by the cited reference to Liu. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the teachings of Griffiths et al. by recycling at least a portion of the product stream as taught by Liu because Liu has taught that recycling results in an overall improvement in conversion and selectivity in the oxidative dehydrogenation of alkane to alkene.

Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the teachings of Griffiths et al. by recycling at least a portion of the product stream as taught by Bharadwaj et al. because the process of Bharadwaj et al. is similar to Griffiths et al., i.e, same reactants and process conditions.

It is noted that the process conditions, i.e., preheat and conversion temperatures, pressure, and molar ratios, of Griffiths et al. overlap with the claimed process conditions. However, it is within the level of one ordinary skill in the art to determine the optimum process conditions through routine experimentation taking into account various factors such as catalysts, reactants, etc.

Claims 2-5, 15-21, 26-29, and 31-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bharadwaj et al. (6,166,283) in view of Griffiths et al. (6,395,944).

The teachings of Bharadwaj et al. are as discusses above. In addition, the reference teaches any molar ratio of paraffinic hydrocarbon to oxygen is suitable, provided the desired olefin is produced in the process. Typically, the molar ratio of paraffinic hydrocarbon to oxygen is greater than about 0.1:1 (col. 6; line 55 to col. 7, line 22). The feed is preheated to temperatures in the range from about 40° C to about 550° C. The conversion process is conducted at a temperature greater than about 750° C but less than 1150°C, pressure in the range of about 1-20 atmosphere absolute, and GHSV greater than 50,000 hr<sup>-1</sup> (col. 15, lines 1-49).

The difference between Bharadwaj et al. and the claimed invention is that the reference does not teach the separation step, specifically cryogenic separation.

The teachings of Griffiths et al. are as discussed above.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Bharadwaj et al. by employing the cryogenic separation taught by Griffiths et al. because Griffiths et al., has taught that any well known means of separation may be employed including cryogenic separation.

It is noted that the process conditions, i.e., preheat and conversion temperatures, pressure, and molar ratios, of Bharadwaj et al. overlap with the claimed process conditions. However, it is within the level of one ordinary skill in the art to determine



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the optimum process conditions through routine experimentation taking into account various factors such as catalysts, reactants, etc.

### ***Conclusion***

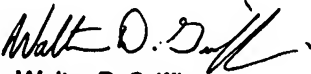
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to In Suk Bullock whose telephone number is 571-272-5954. The examiner can normally be reached on Monday - Friday 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

I.B.

  
Walter D. Griffin  
Primary Examiner